

IN THE CLAIMS:

Please amend claims 1, 30, and 32 as shown below.

1. (Currently Amended) A floating-point unit (FPU) configurable to perform floating-point operations, comprising:
an operand processing section operative to, for each floating-point operation, receive and process one or more input operands to provide a preliminary result comprised of a mantissa and an exponent; and
an operand flush section coupled to the operand processing section and operative to

check at least the exponent of the preliminary result to determine whether the preliminary result falls within one of a plurality of ranges of denormalized values between zero and a minimum normalized floating-point number, a_{\min} , wherein each range of denormalized values is associated with a respective set value defined by a particular exponent value and a particular mantissa value, and

~~set the preliminary result to one of a plurality of set values if the preliminary result falls within one of the plurality of ranges of denormalized values, set the preliminary result to the set value associated with the range of denormalized values within which the preliminary result falls wherein each set value is defined by a particular exponent value and a particular mantissa value.~~

2. (Previously Presented) The FPU of claim 1, wherein the operand flush section is operative to set the preliminary result to one of two set values if the preliminary result falls within one of two ranges of denormalized values between zero and the minimum normalized floating-point number, a_{\min} .

3. (Previously Presented) A floating-point unit (FPU) configurable to perform floating-point operations, comprising:
an operand processing section operative to, for each floating-point operation, receive and process one or more input operands to provide a preliminary result;
and

an operand flush section coupled to the operand processing section and operative to

determine whether the preliminary result falls within a first or second ranges of values, wherein the first range of values includes values greater than zero and less than half of a minimum normalized floating-point number, or $0 < y < a_{\min}/2$, and wherein the second range of values includes values equal to or greater than half of the minimum normalized floating-point number and less than the minimum normalized floating-point number, or $a_{\min}/2 \leq y < a_{\min}$, and

set the preliminary result to a first or second set value if the preliminary result falls within the first or second range of values, respectively.

4. (Original) The FPU of claim 3, wherein the preliminary result is set to zero if it falls within the first range of values and to the minimum normalized floating-point number, a_{\min} , if it falls within the second range of values.

5. (Previously Presented) The FPU of claim 1, wherein the plurality of ranges of denormalized values are selected such that a determination of whether the preliminary result falls within one of the plurality of ranges of denormalized values can be performed by checking only the exponent of the preliminary result.

6. (Previously Presented) The FPU of claim 1, wherein the plurality of ranges of denormalized values are defined by one or more threshold values that are related by factors of two.

7. (Previously Presented) The FPU of claim 1, wherein the operand flush section is operative to check a predetermined number of most significant bits (MSBs) of the exponent of the preliminary result to determine whether the preliminary result falls within the plurality of ranges of denormalized values.

8. (Original) The FPU of claim 1, and operable to perform a reciprocal operation.

9. (Previously Presented) A floating-point unit (FPU) configurable to perform floating-point operations, comprising:

a mantissa processing section operative to, for each floating-point operation,

receive and process one or more mantissas for one or more input operands for the floating-point operation to provide a preliminary result mantissa,

set the preliminary result mantissa to a first mantissa value if a preliminary result for the floating-point operation, comprised of the preliminary result mantissa and a preliminary result exponent, is within a first range of denormalized values between zero and a minimum normalized floating-point number, a_{\min} , and

set the preliminary result mantissa to a second mantissa value if the preliminary result is within a second range of denormalized values between zero and the minimum normalized floating-point number; and

an exponent processing section operative to

receive and process one or more exponents for the one or more input operands for the floating-point operation to provide the preliminary result exponent,

set the preliminary result exponent to a first exponent value if the preliminary result is within the first range of denormalized values, and

set the preliminary result exponent to a second exponent value if the preliminary result is within the second range of denormalized values.

10. (Previously Presented) A floating-point unit (FPU) configurable to perform floating-point operations, comprising:

a mantissa processing section operative to, for each floating-point operation,

receive and process one or more mantissas for one or more input operands for the floating-point operation to provide a preliminary result mantissa,

set the preliminary result mantissa to a first mantissa value if a result for the floating-point operation, comprised of the preliminary result mantissa and a preliminary result exponent, is within a first range of values that

includes values greater than zero and less than a first threshold value defined as half of a minimum normalized floating-point number, or $0 < y < a_{\min}/2$, and
set the preliminary result mantissa to a second mantissa value if the result is within a second range of values that includes values equal to or greater than the first threshold value and less than the minimum normalized floating-point number, or $a_{\min}/2 \leq y < a_{\min}$; and
an exponent processing section operative to
receive and process one or more exponents for the one or more input operands to provide the preliminary result exponent,
set the preliminary result exponent to a first exponent value if the result is within the first range of values, and
set the preliminary result exponent to a second exponent value if the result is within the second range of values.

11. (Previously Presented) The FPU of claim 9, wherein the first mantissa value and the first exponent value represent zero, and wherein the second mantissa value and the second exponent value represent the minimum normalized floating-point number, a_{\min} .

12. (Previously Presented) The FPU of claim 9, wherein a determination of whether the preliminary result is within the first or second range of denormalized values is performed by checking the preliminary result exponent.

13. (Previously Presented) A floating-point unit (FPU) configurable to perform floating-point operations, comprising:

a mantissa processing section operative to, for each floating-point operation,
receive and process one or more mantissas for one or more input operands for the floating-point operation to provide a preliminary result mantissa, and
set the preliminary result mantissa to one of a plurality of mantissa set values if a preliminary result for the floating-point operation, comprised of the preliminary result mantissa and a preliminary result exponent, falls within one of a

plurality of ranges of denormalized values between zero and a minimum normalized floating-point number, a_{\min} ; and
an exponent processing section operative to
receive and process one or more exponents for the one or more input operands for the floating-point operation to provide the preliminary result exponent, and
set the preliminary result exponent to one of a plurality of exponent set values if the preliminary result falls within one of the plurality of ranges of denormalized values.

14. (Previously Presented) The FPU of claim 13, wherein the preliminary result mantissa and the preliminary result exponent are set to one of two set values depending on whether the preliminary result falls within one of two ranges of denormalized values between zero and the minimum normalized floating-point number, wherein each set value is defined by a particular exponent value and a particular mantissa value.

15. (Previously Presented) The FPU of claim 13, wherein the plurality of ranges of denormalized values are selected such that a determination on whether the preliminary result falls within one of the plurality of ranges of denormalized values can be made by checking the preliminary result exponent against one or more exponent comparison values.

16. (Previously Presented) A floating-point unit (FPU) configurable to perform arithmetic operations, comprising:
an exponent processing unit operative to receive and process one or more exponents for one or more input operands for each arithmetic operation to provide a preliminary result exponent partially indicative of a result of the arithmetic operation; and
an exponent flush unit coupled to the exponent processing unit, the exponent flush unit operative to
receive and compare the preliminary result exponent to at least one exponent comparison value greater than zero and less than an exponent value, E_{\min} , for a minimum normalized floating-point number, and

set the preliminary result exponent to one of a plurality of exponent set values based on results of the comparison between the preliminary result exponent and the at least one exponent comparison value.

17. (Previously Presented) A floating-point unit (FPU) configurable to perform arithmetic operations, comprising:

an exponent processing unit operative to receive and process one or more exponents for one or more input operands for each arithmetic operation to provide a preliminary result exponent partially indicative of a result of an arithmetic operation; and

an exponent flush unit coupled to the exponent processing unit and operative to

receive and compare the preliminary result exponent to an exponent comparison value, $E_{\min} - 1$, that is equal to one less than an exponent value, E_{\min} , for a minimum normalized floating-point number, and

set the preliminary result exponent to one of a plurality of exponent set values based on results of the comparison between the preliminary result exponent and the exponent comparison value.

18. (Original) The FPU of claim 17, wherein the preliminary result exponent is set to E_{\min} if it is equal to the exponent comparison value of $E_{\min} - 1$.

19. (Previously Presented) The FPU of claim 17, wherein the preliminary result exponent is set to an exponent value for a floating-point zero if it is less than the exponent comparison value of $E_{\min} - 1$.

20. (Previously Presented) A floating-point processor comprising:

a memory unit operative to store instructions;

an instruction dispatch unit operative to retrieve instructions from the memory unit; and

a floating-point unit (FPU) coupled to the instruction dispatch unit and operative to

perform a floating-point operation on one or more input operands to provide a preliminary result comprised of a mantissa and an exponent,

check at least the exponent of the preliminary result to determine whether the preliminary result falls within a first or second range of denormalized values between zero and a minimum normalized floating-point number, a_{\min} ,

flush the preliminary result to zero if the preliminary result falls within the first range of denormalized values, and

set the preliminary result to a set value if the preliminary result falls within the second range of denormalized values, wherein the set value is defined by a particular exponent value and a particular mantissa value.

21. (Previously Presented) A floating-point processor comprising:
a memory unit operative to store instructions;
an instruction dispatch unit operative to retrieve instructions from the memory unit; and
a floating-point unit (FPU) coupled to the instruction dispatch unit and operative to perform a floating-point operation on one or more input operands to provide a preliminary result, wherein the preliminary result is flushed to zero if it falls within a first range of values and set to a set value if it falls within a second range of values, wherein the first range of values includes values greater than zero and less than half of a minimum normalized floating-point number, or $0 < y < a_{\min}/2$, and wherein the second range of values includes values equal to or greater than half of the minimum normalized floating-point number and less than the minimum normalized floating-point number, or $a_{\min}/2 \leq y < a_{\min}$.

22. (Previously Presented) The floating-point processor of claim 20, wherein a determination on whether the preliminary result falls within the first or second range of denormalized values is made by checking only the exponent of the preliminary result.

23. (Previously Presented) A method for performing a floating-point operation, comprising:
receiving one or more input operands for the floating-point operation;
processing the one or more input operands to provide a preliminary result comprised of a mantissa and an exponent;

checking at least the exponent of the preliminary result to determine whether the preliminary result is within a first or second range of denormalized values between zero and a minimum normalized floating-point number, a_{\min} ;

setting the preliminary result to a first set value if the preliminary result is within the first range of denormalized values, the first set value being defined by a first exponent value and a first mantissa value; and

setting the preliminary result to a second set value if the preliminary result is within the second range of denormalized values, the second set value being defined by a second exponent value and a second mantissa value.

24. (Previously Presented) The method of claim 23, further comprising: checking the exponent of the preliminary result to determine whether the preliminary result falls within the first or second range of denormalized values.

25. (Previously Presented) The method of claim 23, wherein the first set value is zero and the second set value is the minimum normalized floating-point number.

26. (Previously Presented) A method for performing a floating-point operation, comprising:

receiving one or more input operands for the floating-point operation;

processing the one or more received operands to provide a preliminary result;

determining whether the preliminary result is within a first or second range of values, wherein the first range of values includes values greater than zero and less than half of a minimum normalized floating-point number, and wherein the second range of values includes values equal to or greater than half of the minimum normalized floating-point number and less than the minimum normalized floating-point number;

setting the preliminary result to a first value if it is within the first range of values; and

setting the preliminary result to a second value if it is within the second range of values.

27. (Previously Presented) A computer program product for performing a floating-point operation, comprising:

code that directs reception of one or more input operands for the floating-point operation;

code that processes the one or more input operands to provide a preliminary result comprised of a mantissa and an exponent;

code that checks at least the exponent of the preliminary result to determine whether the preliminary result is within a first or second range of denormalized values between zero and a minimum normalized floating-point number, a_{\min} ;

code that sets the preliminary result to a first set value if the preliminary result is within the first range of denormalized values, the first set value being defined by a first exponent value and a first mantissa value;

code that sets the preliminary result to a second set value if the preliminary result is within the second range of denormalized values, the second set value being defined by a second exponent value and a second mantissa value; and

a data storage medium operative to store the codes.

28. (Previously Presented) The computer program product of claim 27, wherein the code checks only the exponent of the preliminary result to determine whether the preliminary result falls within the first or second range of denormalized values.

29. (Previously Presented) A computer program product for performing a floating-point operation, comprising:

code that directs reception of one or more input operands for the floating-point operation;

code that processes the one or more received operands to provide a preliminary result;

code that determines whether the preliminary result is within a first or second range of values, wherein the first range of values includes values greater than zero and less than half of a minimum normalized floating-point number, and wherein the second range of values includes values equal to or greater than half of the minimum normalized floating-point number and less than the minimum normalized floating-point number;

code that sets the preliminary result to zero if it is within the first range of values;

code that sets the preliminary result to the minimum normalized floating-point number if it is within the second range of values; and

a data storage medium operative to store the codes.

30. (Currently Amended) An article of manufacture comprising:

computer-readable program code that causes a computer to describe an operand processing section, wherein the operand processing section is operative to, for each floating-point operation, receive and process one or more input operands for the floating-point operation to provide a preliminary result comprised of a mantissa and an exponent;

computer-readable program code that causes a computer to describe an operand flush section, wherein the operand flush section is operative to check at least the exponent of the preliminary result to determine whether the preliminary result falls within one of a plurality of ranges of denormalized values between zero and a minimum normalized floating-point number, a_{\min} , and to set the preliminary result to one of a plurality of set values if the preliminary result falls within one of the plurality of ranges of denormalized values, wherein each range of denormalized values is associated with a respective set value is defined by a particular exponent value and a particular mantissa value, and wherein the preliminary result is set, if at all, to the set value associated with the range of denormalized values within which the preliminary result falls; and

a computer-usable medium configured to store the computer-readable program codes.

31. (Previously Presented) An article of manufacture comprising:

computer-readable program code that causes a computer to describe a memory unit, wherein the memory unit is operative to store instructions;

computer-readable program code that causes a computer to describe an instruction dispatch unit, wherein the instruction dispatch unit is operative to retrieve instructions from the memory unit;

computer-readable program code that causes a computer to describe a floating-point unit (FPU), wherein the FPU couples to the instruction dispatch unit and is operative to

perform a floating-point operation on one or more input operands to provide a preliminary result comprised of a mantissa and an exponent,

check at least the exponent of the preliminary result to determine if the preliminary result falls within a first or second range of denormalized values between zero and a minimum normalized floating-point number, a_{\min} ,

flush the preliminary result to zero if the preliminary result falls within the first range of denormalized values, and

set the preliminary result to a set value if the preliminary result falls within the second range of denormalized values, wherein the set value is defined by a particular exponent value and a particular mantissa value; and

a computer-usable medium configured to store the computer-readable program codes.

32. (Currently Amended) A computer data signal embodied in a transmission medium comprising:

computer-readable program code that causes a computer to describe an operand processing section, wherein the operand processing section is operative to, for each floating-point operation, receive and process one or more input operands for the floating-point operation to provide a preliminary result comprised of a mantissa and an exponent; and

computer-readable program code that causes a computer to describe an operand flush section, wherein the operand flush section is coupled to the operand processing section and operative to check at least the exponent of the preliminary result to determine whether the preliminary result falls within one of a plurality of ranges of denormalized values between zero and a minimum normalized floating-point number, a_{\min} , and to set the preliminary result to one of a plurality of set values if the preliminary result falls within one of the plurality of ranges of denormalized values, and wherein each range of denormalized values is associated with a respective set value is defined by a particular exponent value and a particular mantissa value, and wherein the preliminary

result is set, if at all, to the set value associated with the range of denormalized values within which the preliminary result falls.